"Pig iron, caustic soda, wood pulp, and scores of similar articles, costing, comparatively speaking, a few shillings per ton, are bought and sold on the basis of strict analytical standards; but india-rubber, costing from 150*l.* to 500*l.* per ton, changes hands without either buyer or seller having more than a vague knowledge of its intrinsic value."

A full description is given of the various india-rubber substitutes now so frequently used, and which consist either of recovered rubber from cast-off articles or of the products obtained by the action of oxygen, sulphur or sulphur chloride upon such substances as linseed or colza oils. Inorganic compounding materials, vulcanising agents, solvents, colouring matters and textile fabrics each claim a chapter; and, as might be expected from a writer of Dr. Weber's experience and attainments, the treatment of all these subjects is eminently practical without in any degree lacking scientific precision.

Analysts and technical chemists who are called upon to examine india-rubber will be grateful for the chapter on the analysis of rubber articles, with which the volume proper closes. Information previously scattered in periodicals is here readily available, and the usefulness of the chapter is much enhanced by a section dealing with the interpretation of analytical results. Chemists should note that nitro-naphthalene is recommended as a "solvent" for india-rubber in preference to the nitro-benzene hitherto generally employed.

On the whole, the author's style is lucid and his English readable. Occasionally one meets with a tortuous sentence or a quaint prepositional usage, and the book generally, perhaps, lacks lightness of touch. Here and there, also, a word occurs which does not exactly convey the meaning intended, and rather reminds the present writer of the youthful essayist who, describing a storm at sea, remarked that a boy was drowned before his parents' eyes, and that "it was all the more awful because the father and mother were just on their honeymoon." Such blemishes, however, are small matters in a work of this kind. The book was wanted, and is a welcome acquisition. It is written by a man who knows his subject and who writes as if he loved it. The author is to be congratulated upon a very useful contribution to a somewhat obscure and difficult branch of technical science.

C. SIMMONDS.

A BRITISH BOOK OF CONSTANTS.

Physico-Chemical Tables. Vol. I. *Chemical Engineering and Physical Chemistry.* By John Castell-Evans F.C.S. Pp. xxxii + 548. (London: Chas. Griffin and Co., Ltd.) Price 24*s.* net.

THIS volume is the first half of an elaborate work intended to be a compendium of tables and data covering the whole domain of physical chemistry, for use both in the laboratory and the works. The scheme is an ambitious one, and the labour of compiling the present 548 pages of closely printed matter must have been no light task. The book which Mr. Castell-Evans's work most closely resembles is undoubtedly Landolt and Börnstein's well-known treatise, which is about the only one with which the writer is acquainted covering the same field. The chief difference between the two books lies in the fact that Mr. Evans has included about sixty pages of arithmetical and algebraical data, which should prove quite useful.

The book is, on the whole, well arranged and exceedingly comprehensive, and some of the original tables it contains are among the best. The reviewer feels, however, that one of its chief demerits lies in the over-elaboration of some matters and the very unnecessary rows of figures, which many of the tables give.

For instance, what possible significance can the last two or even three figures have, when from table 47 G we learn that a barometer column of 30 inches at 54° F. is equivalent to 29·940213 inches at 32° F.? or of what use is it to have the equivalent of a mile in metres given to fourteen significant figures when 10^{-8} metre is about the limit attainable in the comparison of primary standards of length of the highest class?

Regarding the material of the work as a whole, a careful perusal gives a general impression that the author collected his materials and retired into his study to write his book six or eight years ago, and when the book came to be published overlooked the fact that our knowledge of some of the most important questions dealt with has advanced very materially during this period. For instance, we look in vain, under the specific heat of water or mechanical equivalent of heat, for mention of the work of Griffiths, of Schuster and Gannon, of Callendar and Barnes, or of Reynolds and Moorby, whose different researches, all published during the past few years, have practically settled this question. While dealing with this point, we notice that there occurs here in the familiar form the good old text-book tradition that Regnault *determined* the specific heat of water between ordinary temperatures and 100° C. In justice to Mr. Evans, however, we should mention that in his book several other similar errors, which we had come to recognise as almost always with us, are conspicuous by their absence, and the book bears strong evidence that in a great many cases the original authorities have been consulted.

We have verified many of the numbers, and have not detected many serious errors properly so called. In some cases, however, this may be due to the decided superabundance of data in many of the tables (as, for example, that of melting points on pp. 380, *et seq*). We find there for the melting point of gold,

1140°, 1200°, 1037°, 1092°, 1240°, 1250°, 1380°, 1100°, 1035°, 1045; most probable value 1050°;

and for silver,

999°, 1024°, 1000°, 1032°, 916°, 1023°, 1040°, 954°, 968°; most probable value 968°;

whereas modern authorities are agreed that 1062 ± 2° is a close approximation for the melting point of gold, that of silver in a reducing atmosphere being very sensibly 100° lower.

The most commendable part of the book is the section dealing with vapour pressures, critical volumes, &c., the results of the voluminous researches of Ramsay and Young and other modern workers being here, with both formulæ and tables, given in full.

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In conclusion, we congratulate the author on having carried out so formidable a task as the compilation of these tables apparently single-handed. Should a second edition be necessary, revision of some parts and condensation to two-thirds its present bulk would make it a decidedly useful work.

J. A. H.

OUR BOOK SHELF.

Natural and Artificial Sewage Treatment. By Jones and Roechling. Pp. vii + 96. (London: Spon, 1902.)

THE authors state that they are making public in the above treatise information which they have already brought before different societies of professional men, but they claim that while putting the matter forward in a new form, they have also brought it up to date. This is doubtless the case with the statements concerning treatment of sewage on the land, but the treatment by bacteria beds is not so satisfactorily brought up to the date of publication. In fact, the impression produced by a careful perusal of the book is that the presentation of the two methods of treatment by land and by bacteria tanks and beds is such as to indicate a very considerable predilection for the sewage farm. This impression is caused, not by an overstatement of the results of sewage farming, but by an understatement of the permanency and advantages of an artificial bacterial installation. The authors do not lay stress, as they should in fairness do, on the fact that what they term the "artificial" bacterial treatment is the bacterial treatment of the sewage farm carried out under regulated and controlled conditions which add much to the precision, uniformity and regularity of the process of purification. When they place to the advantage of land treatment that it removes pathogenic germs, they are on doubtful ground; and when they speak of the entire loss of manurial value and the production of larger volume of effluent by the artificial bacterial process as disadvantageous, they apparently forget that bacterial effluents are not infrequently directly or indirectly used in certain parts of the year for irrigation, and further, that a larger volume of good effluent turned into a watercourse is usually of direct advantage.

Some statements are, moreover, open to serious question and have not been decided in the sense stated. Such is the oft-repeated one that treatment of ordinary sewage causes bacteria beds rapidly to silt up and that their material requires renewal, that their capacity is not permanently increased by resting, that they are peculiar in requiring careful management and that a covering of scum is necessary to the action in the so-called "septic tank." It should have been stated that beds which silt up are either improperly constructed, are being improperly treated or are receiving abnormal sewage, and that bacterial treatment, whether effected on land or in artificially constructed spaces, is identical in its cause and its nature and requires similar considerate management. Both processes have frequently failed because they have been inconsiderately provided for and dealt with.

If the above considerations are borne in mind, "district councillors, sanitarians and all interested in this complicated process" may with advantage peruse the little book, and they will find that, in the second part more especially, information of real value is presented in a lucid and intelligible form.

It might have been anticipated from the title of the book that chemical processes of treatment received notice. It is satisfactory to find that they are not dealt with, and that the terms "natural and artificial," as applied to sewage treatment, are intended to refer to land treatment and to so-called bacterial treatment respectively. It should be remembered that both these treatments are "naturally" effected in the main by the bacteria present in the sewage itself, and that the laying out of a sewage farm is as truly artificial as the provision of beds of flints, pebbles or other materials for so-called contact treatment.

Thomson's Gardener's Assistant. New Edition. Pp. viii + 607. (London: The Gresham Publishing Company, 1900–1902). Six Vols., 8*s.* each.

THIS important horticultural work, revised and entirely remodelled under the able direction and general editorship of Mr. W. Watson, Curator, Royal Gardens, Kew, has now been completed. It has been published in six divisional volumes, or in two volumes of 656 and 607 pages respectively. Many specialists have contributed to the work, and a glance at a list of their names with the articles for which they are severally responsible is sufficient to prove the value of this great addition to the literature of gardening.

Divisional vol. i. contains about forty pages on "Plant Structure," an epitome of such portions of botanical science as are of most interest to the gardener, by Dr. M. T. Masters. "Insect and other Plant Enemies," as also an article on "Garden Friends," are well treated by Mr. J. Fraser. Mr. G. Massee, our greatest authority, writes on "Plant Diseases caused by Fungi." All these articles are well illustrated and clearly and pleasantly written. Soils and manures are treated at length by Mr. Willis. Tools and instruments and garden structures are thoroughly dealt with, described and, when desirable, illustrated—the underlying principles being explained in a concise and lucid manner.

Divisional vol. ii. has articles, all well illustrated, on heating, propagation, transplanting, pruning, flower-garden and pleasure-grounds, hardy ornamental trees and shrubs, hardy herbaceous perennials, aquatic and bog plants, hardy and half-hardy annuals and popular garden plants.

Divisional vol. iii. treats on the greenhouse and conservatory, gives a select list of desirable stove and greenhouse plants with full cultural details. The orchids are fully treated by Mr. J. O'Brien, a descriptive list of the more important ones from a garden standpoint being given, together with full particulars as to their requirements and cultivation; plans of orchid houses even are given. Other special articles are those on ferns, palms and cycads, succulent plants, summer bedding, the subtropical garden, floral decorations, &c.

The remaining three divisional volumes deal fully and carefully with the fruit and kitchen garden. Lists of the best varieties are in each case given, and in some instances, under "Asparagus," for instance, the methods pursued by present-day market cultivators near London, and also about Paris, are described pretty fully.

Calendarial directions for each department of the garden for each month are contained towards the close of the last volume, in which are also treated the best methods of collecting, packing and storing vegetables, &c.

We think that, taken altogether, the present edition of "Thomson's Gardener's Assistant" may fairly be regarded as the standard book on British gardening.

G. N.

Proceedings of the Aristotelian Society. New Series. Vol. ii. Pp. 240. (London: Williams and Norgate, 1902.)

THIS collection of papers read before the Aristotelian Society during the session 1901–2 maintains the decidedly high level reached by previous volumes. For the professed metaphysician there will be special interest in the essays of Dr. G. F. Stout and Mr. H. W. Carr, who both take up, though on rather diverging lines,

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